



### Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

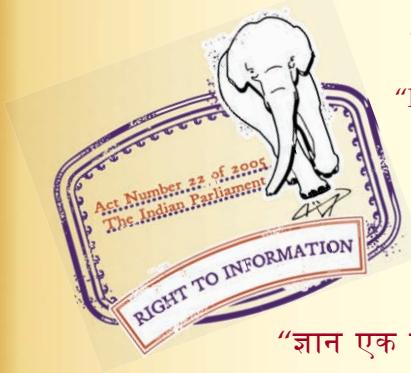
“Step Out From the Old to the New”

IS 6769-2 (1972): Direct Reading Pointer Indicator Type AC Electronic Millivoltmeter, Part 2: With a Frequency Range of 2 Hz to 1 Mhz [LITD 8: Electronic Measuring Instruments, Systems and Accessories]

“ज्ञान से एक नये भारत का निर्माण”

Satyanareshwaran Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartṛhari—Nītiśākām

“Knowledge is such a treasure which cannot be stolen”





BLANK PAGE



PROTECTED BY COPYRIGHT

*Indian Standard*

SPECIFICATION FOR  
DIRECT READING POINTER INDICATOR  
TYPE AC ELECTRONIC MILLIVOLTMETER

PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

UDC 621.317.725 : 621.38



© Copyright 1973

INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 1

Gr 2

May 1973

# Indian Standard

## SPECIFICATION FOR DIRECT READING POINTER INDICATOR TYPE AC ELECTRONIC MILLIVOLTMETER

### PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

Electronic Equipment Sectional Committee, ETDC 24

*Chairman*

\*SHRI Y. VENKATARAMIAH

*Representing*

Directorate General of All India Radio ( Ministry of  
Information & Broadcasting )

*Members*

RESEARCH ENGINEER, AIR ( *Alternate to*  
Shri Y. Venkataramiah )

ADDITIONAL DIRECTOR Railway Board ( Ministry of Railways )

DEPUTY DIRECTOR STANDARDS  
( TELECOMMUNICATIONS ) ( *Alternate* )

SHRI H. K. L. ARORA All India Radio and Electronics Association, Bombay

SHRI R. G. KESWANI ( *Alternate* )  
( Bombay )

SHRI ARUP CHAUDHURI ( *Alternate* )  
( Calcutta )

SHRI L. S. V. EASWAR ( *Alternate* )  
( Madras )

ASSISTANT DIRECTOR, ELECTRICAL Naval Headquarters  
ENGINEERING ( DESIGN )

ASSISTANT DIRECTOR, ELECTRI-  
CAL ENGINEERING ( MATERIAL ) ( *Alternate* )

SHRI H. V. BADRINATH Wireless Planning & Co-ordination Wing ( Depart-  
ment of Communications )

SHRI A. M. JOSHI ( *Alternate* )

SHRI BALRAJ BHANOT Directorate General of Technical Development  
( Ministry of Supply, Technical Development &  
Materials Planning )

BRIG B. BHASIN Directorate General of Inspection ( Ministry of  
Defence )

SHRI J. M. BORDE All India Instrument Manufacturers' and Dealers'  
Association, Bombay

SHRI N. GANESAN ( *Alternate* )

( *Continued on page 2* )

\*Shri Y. Venkataramiah was Chairman for the meeting in which this standard was  
finalized.

© Copyright 1973

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* ( XIV of 1957 ) and  
reproduction in whole or in part by any means except with written permission of the  
publisher shall be deemed to be an infringement of copyright under the said Act.

( *Continued from page 1* )

<i>Members</i>	<i>Representing</i>
<b>DEPUTY DIRECTOR GENERAL</b>	<b>Overseas Communications Service ( Department of Communications )</b>
<b>DIRECTOR ( Alternate )</b>	
SHRI B. P. GHOSH	National Test House, Calcutta
SHRI S. T. KAGALI	Bharat Electronics Ltd, Bangalore
SHRI K. S. KELKAR ( Alternate I )	
SHRI R. S. MUNDKUR ( Alternate II )	
Wg Cdr J. S. LAMBA	Directorate of Technical Development & Production ( Air ) ( Ministry of Defence )
SHRI A. V. RAJU ( Alternate )	Police Wireless ( Ministry of Home Affairs )
COL N. S. MATHUR	
SHRI R. S. KALE ( Alternate )	Radio Electronics & Television Manufacturers' Association ( RETMA ), Bombay
SHRI K. P. P. NAMBIAR *	
SHRI R. K. JAIN ( Alternate )	Radio Transmitters Subcommittee, ETDC 24 : 4, ISI
SHRI D. V. PHATAK	Safety for Electronic Equipment Subcommittee, ETDC 24 : 3, ISI
SHRI T. V. RAMAMURTI	
SHRI V. RAMA SUBRAMANYAM	Directorate General of Civil Aviation ( Department of Civil Aviation )
DR RAM PARSHAD	National Physical Laboratory ( CSIR ), New Delhi; and Electronic Measuring Equipment Subcommittee, ETDC 24 : 2, ISI
SHRI D. K. SACHDEV	Indian Telephone Industries Ltd, Bangalore
SHRI G. B. DIXIT ( Alternate )	
SHRI M. SANKARALINGAM	
SHRI P. T. KRISHNAMCHAR ( Alternate )	Directorate General of Supplies & Disposals ( Ministry of Supply, Technical Development & Materials Planning )
SHRI T. V. SRIRANGAN	Posts & Telegraphs Board, New Delhi
SHRI N. SRINIVASAN,	Director General, ISI ( <i>Ex-officio Member</i> )
Deputy Director ( Elec tech )	
( Secretary )	

**Electronic Measuring Equipment Subcommittee, ETDC 24 : 2**

<i>Convenor</i>	
<b>DR RAM PARSHAD</b>	<b>National Physical Laboratory ( CSIR ), New Delhi</b>
<i>Members</i>	
SHRI T. N. GHOSH ( Alternate to Dr Ram Parshad )	
SHRI N. BALASUNDRAM	Eastern Electronics, Faridabad
Lt-Col R. C. DHINGRA	Directorate General of Inspection ( Ministry of Defence )
MAJ G. R. MAHADEVAN ( Alternate )	
SHRI N. GANESAN	Associated Instrument Manufacturers ( India ) Pvt Ltd, New Delhi
SHRI D. PAHWA ( Alternate )	
SHRI P. K. MANTRI	Toshniwal Bros Pvt Ltd, Ajmer
SHRI G. SUBBA RAO ( Alternate )	

( *Continued on page 8* )

## *Indian Standard*

### SPECIFICATION FOR DIRECT READING POINTER INDICATOR TYPE AC ELECTRONIC MILLIVOLTMETER

#### PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

#### 0. FOREWORD

**0.1** This Indian Standard ( Part II ) was adopted by the Indian Standards Institution on 7 December 1972, after the draft finalized by the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** The provisions of this standard apply to the complete apparatus and not to component parts thereof.

**0.3** This standard should be used in conjunction with IS : 6769 ( Part I )-1972\* and IS : 3437-1972†.

**0.4** Assistance has been derived from the following while preparing this standard:

IEC Pub 217 ( 1967 ) Electronic voltmeters. International Electrotechnical Commission.

BS 4205 : 1967 Specification for electronic voltmeters. British Standards Institution.

**0.5** This standard is one of a series of Indian Standards on electronic measuring equipment. A list of standards so far published in this series is given on fourth cover page.

**0.6** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960‡. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

\*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

†General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

‡Rules for rounding off numerical values ( revised ).

## 1. SCOPE

**1.1** This standard ( Part II ) lays down the minimum performance requirements and characteristics to be specified for direct reading pointer indicator type ac electronic millivoltmeter for the measurement of alternating voltages in the frequency range of 2 Hz to 1 MHz.

**1.1.1** The climatic and mechanical durability requirements of these millivoltmeters are under consideration.

## 2. TERMINOLOGY

**2.0** For the purpose of this standard the definitions and explanation of terms specified in 2 of IS : 3437-1972\* shall apply.

## 3. CONSTRUCTIONAL REQUIREMENTS

**3.1** The provisions of 3 of IS : 3437-1972\* shall apply as modified by **3.1.1**.

**3.1.1** The panel-meter shall have a minimum 100 divisions, each division being of 0.8 mm width.

## 4. WORKMANSHIP AND FINISH

**4.1** The provisions of 5 of IS : 3437-1972\* shall apply.

## 5. CONTROLS AND ADJUSTMENTS

**5.1** The provisions of 6 of IS : 3437-1972\* shall apply.

## 6. POWER SUPPLY

**6.1** The provisions of 7 of IS : 3437-1972\* shall apply.

## 7. CHARACTERISTICS OF ELECTRONIC VOLTMETERS

### 7.1 Basic Characteristics

**7.1.1 Accuracy Class** — The accuracy classes covered in this standard are 1.5, 2.5 and 5 ( see also **2.8.2** and **4.1** of IS : 3437-1972\* ).

**7.1.2 Permissible Intrinsic Error** — The permissible intrinsic error under reference conditions and between the limits of the effective range shall be one of the following:

- ± 1.5 percent
- ± 2.5 percent
- ± 5 percent

---

\*General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

**7.1.3 Voltage Ranges** — The instrument shall be capable of measuring ac voltages from 10 mV full scale deflection up to 100 V full scale deflection in suitable ranges. The instrument may also be calibrated in decibels and a separate decibel scale shall be provided.

**7.1.3.1** The rating of effective ranges shall preferably be chosen from the following basic series or their decimal multiples or fractions ( see 3.4.1 of IS : 3437-1972\* ).

- a) 1,  $\sqrt{10}$ , 10 ( for voltage and dB ); and
- b) 1, 3, 10 ( for voltage ).

**7.1.4 Calibration** — The calibration shall be for rms values. If it is otherwise, such as peak, average or logarithmic, it shall be indicated on the instrument.

**7.1.5 Type of Input** — The type of input shall be single ended. Other types of input, such as symmetrical or differential may be provided.

**7.1.6 Input Impedance** — The input impedance expressed in terms of its equivalent parallel resistive and reactive components shall be as follows:

Input resistance — 1 M $\Omega$ , *Min*

Input capacitance — 25 pF, *Max*

**7.1.7 Warm-Up Period** — The time taken by the instrument to attain stability within the permissible intrinsic error specified shall not be greater than 15 minutes.

## 7.2 Other Characteristics

**7.2.1 Variation in Indication** — Permissible variation in indication for the three classes of voltmeters covered by this standard ( see 7.1.1 ) shall be as specified in Table 1 for various influence quantities.

**7.2.2 Damping** — The damping of a voltmeter characterised by its overshoot and settling time shall be measured in accordance with 9 of IS : 6769 ( Part I )-1972† and shall satisfy the following requirements:

- a) *Overshoot* — Under the test conditions, the overshoot shall not exceed the upper limit of effective range.
- b) *Settling time* — Under the test conditions, the time required for the index to attain its final steady position within 1.5 percent of the upper limit of the effective range shall not exceed 4 seconds.

\*General requirements for direct reading pointer indicator type electronic voltmeter ( first revision ).

†Specification for direct reading pointer indicator type ac electronic millivoltmeter; Part I Methods of measurements.

TABLE 1 VARIATION IN INDICATION

( Clause 7.2.1 )

INFLUENCING QUALITY	CL REF OF IS : 6769 ( Part I )- 1972*	VARIATION IN INDICATION		
		Class Index 1.5 percent	Class Index 2.5 percent	Class Index 5.0 percent
a) Position	5.5	± 1.5	± 2.5	± 5.0
b) Ambient temperature change	5.6	± 1.5	± 2.5	± 5.0
c) External magnetic field:	11			
1) When specified by the manufacturer		± 1.5	± 2.5	± 5.0
2) At 0.5 millitesla (when not specified by the manufacturer)		± 3.0	± 3.0	± 3.0
d) External electric field	12	Under	consideration	
e) External RF electromagnetic field	13	Under	consideration	
f) Supply voltage change:	5.3			
1) First sudden 5 percent variation (maximum variation)		± 0.75	± 1.25	± 2.5
2) Second sudden 5 percent variation (final variation)		± 0.75	± 1.25	± 2.5
g) Super-imposed ac input voltage	5.4	± 1.5	± 2.5	± 5.0
h) Frequency of measured voltage:	7			
1) Over 10 Hz to 100 kHz		± 1.5	± 2.5	± 5
2) Over 2 Hz to 1 MHz		± 3	± 5	± 10
j) Swinging	8	± 1.5	± 2.5	± 5.0
k) Fluctuation (random and spurious variation)	5.1	± 0.75	± 1.25	± 2.5
m) Drift	5.2	± 1.5	± 2.5	± 5.0

NOTE — The maximum voltage applied shall not exceed insulation voltage of the instrument.

h) Frequency of measured voltage:	7			
1) Over 10 Hz to 100 kHz		± 1.5	± 2.5	± 5
2) Over 2 Hz to 1 MHz		± 3	± 5	± 10
j) Swinging	8	± 1.5	± 2.5	± 5.0
k) Fluctuation (random and spurious variation)	5.1	± 0.75	± 1.25	± 2.5
m) Drift	5.2	± 1.5	± 2.5	± 5.0

\*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

### 7.2.3 Errors Due to Overload

7.2.3.1 After being subjected to the continuous overload test in accordance with 10.1 of IS : 6769 ( Part I )-1972\*, the voltmeter shall comply with the requirements of its specified accuracy.

7.2.3.2 After being subjected to the test for overload for short duration in accordance with 10.2 of IS : 6769 ( Part I )-1972\*, the voltmeter shall comply with the requirements of its specified accuracy.

## 8. MARKING

8.1 The provision of 8 of IS : 3437-1972† shall apply in addition to 8.1.1.

8.1.1 The instrument may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 9. TECHNICAL DOCUMENTATION TO BE SUPPLIED WITH THE INSTRUMENT

9.1 The provision of 9 of IS : 3437-1972† shall apply.

---

\*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

†General requirements for direct reading pointer indicator type electronic voltmeter ( *first revision* ).

( Continued from page 2 )

*Members*

SHRI M. N. MATHUR  
SHRI J. S. MONGA  
SHRI S. B. NIRODI  
SHRI D. V. PETKAR  
SHRI D. V. S. RAJU

SHRI C. S. RANGAN

SHRI M. T. SRIVATSA ( *Alternate* )

SHRI S. RANGARAJAN  
RESEARCH ENGINEER  
SHRI G. C. SAXENA

*Representing*

Telecommunication Research Centre ( P & T Board )  
Radiola Corporation, New Delhi  
Philips ( India ) Ltd, Calcutta  
Bhabha Atomic Research Centre, Bombay  
Electronic & Industrial Instruments Co Pvt Ltd,  
Hyderabad  
National Aeronautical Laboratory ( CSIR ),  
Bangalore

Bharat Electronics Ltd, Bangalore  
Directorate General of All India Radio, New Delhi  
Electronics Corporation of India Ltd, Hyderabad

# INDIAN STANDARDS

ON

## ELECTRONIC MEASURING EQUIPMENT

IS:

2390-1963 Methods of measurements for amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s)  
2321-1963 Requirements for general purpose amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s)  
2711-1966 Direct reading pH meters (revised)  
3437-1972 General requirements for direct reading pointer indicator type electronic voltmeter (first revision)  
3596-1966 Minimum requirements for general purpose audio frequency signal generators (30 c/s to 30 kc/s)  
3915-1967 Methods of measurements on audio frequency signal generators (30 c/s to 30 kc/s)  
4309-1967 Methods of measurement on direct reading pH meters  
4330-1967 Methods of measurements on cathode-ray oscilloscope (dc to 10 Mc/s)  
6700-1972 Requirements for general purpose cathode-ray oscilloscope  
6756-1972 Technical documentation to be supplied with electronic measuring equipment  
6767 (Part I)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part I Methods of measurements  
6767 (Part II)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part II Up to 30 MHz  
6767 (Part III)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part III Up to 300 MHz  
6769 (Part I)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements  
6769 (Part II)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part II With a frequency range of 2 Hz to 1 MHz  
6804-1972 Glass electrodes for direct reading pH meters

---

## INDIAN STANDARDS INSTITUTION

Manak Bhawan, 9 Bahadur Shah Zafar Marg, New Delhi 1

Telephone : 27 81 31 (20 lines)

*Branch Offices:*

• Sudhna', Nurmohamed Shaikh Marg, Khanpur  
F Block, Unity Bldg, Narasimha Rao Square  
634 Sardar Vallabhbhai Patel Road  
5 Chowringhee Approach  
5-9-201/2-A (First Floor), Chirag Ali Lane  
117/418 B Sarvadeva Nagar  
54 General Potters Road

Telegrams : Mansaksantha

	Telephone
Ahmedabad 1	2 03 91
Bangalore 2	2 76 49
Bombay 7	35 69 44
Calcutta 13	23-08-02
Hyderabad 1	3 44 36
Kenpur 5	82 72
Madras 2	8 72 78